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Colorado Department of Health
Hazardous Materials & Waste Management Division
and
U.S. Environmental Protection Agency

Comments
on
Draft Final
TECHNICAL MEMORANDUM NO. 2
FOR
PHASE I RFI/RI OF OPERABLE UNIT NO. 7
HUMAN HEALTH RISK ASSESSMENT MODEL DESCRIPTION

June 2, 1993

Comment #1 — Section 1.1. The statement on page 1-2 that "This document does not address the application of the selected models to the site-specific conditions at OU7..." should be clarified. This document should clearly show that the chosen models are capable of dealing with site-specific conditions and that they generate data necessary to support the decision process. If not, these models should not be used and the scope of Technical Memorandum No. 2 (TM2) should be re-examined.

Response — The sentence will be clarified to state that "Values for modeling parameters will be identified or refined when site-specific Phase I results for OU7 become available. Application of the selected models to the site-specific conditions at OU7 will be included in the Phase I RFI/RI Report."

Comment #2 — Section 1.2. The speculation on future uses for Rocky Flats Plant (RFP) contained in the last three paragraphs of this section on page 1-4 are probably better left till later discussions of land use. For instance, the speech by the former Secretary of Energy is already mentioned in Section 1.10 on page 1-29.

Response — We agree. Discussions of future land use will be deleted from this section. Discussions of subsequent sections will be made consistent with the information presented in Technical Memorandum No. 1 (Exposure Assessment).

Comment #3 — Section 1.3.1. The calculations for volume of material in the landfill are

through 1990 only. A more current estimate should be calculated.

Response — Estimates of the volume of landfill material presented in Section 1.3.1 represent historical information provided in the Phase I RFI/RI Work Plan for OU7. A more current estimate of the volume of landfill material will be made using information obtained during the RFI/RI. This updated estimate will be used in the air emission modeling for IHSS 114.

Comment #4 — Section 1.10. The DOE 1990 reference cited throughout this section of the document uses 1980 census data. Using this outdated information to support a projection of zero population growth in the area immediately adjacent to RFP is highly suspect given the change in plant mission.

This section repeatedly emphasizes commercial/industrial land uses or an ecological preserve as the preferred alternatives for RFP. These are, however, only two of the choices available. Industrial land use has not and probably will not "dominate" future land use in northeastern Jefferson County, particularly given the plant mission change and the pace of residential development in the area.

In light of potential policy changes by the new administration and new Energy Secretary, paraphrasing the former Energy Secretary on page 1-29 should be reconsidered. Issues raised in this section should be clarified by knowledgeable DOE sources. This information should not be coming from the cited sources (*Denver Post, Boulder Daily Camera*, RFLIT).

Response — Information on land use and demographics will be revised as follows:

(a) Commercial and industrial land uses will be de-emphasized and a more neutral discussion provided, as was done in response to similar comments on Technical Memorandum No. 1.

(b) Information not critical to the selection and evaluation of exposure pathways will be deleted from the text.

(c) The discussion of demographics and land use will be greatly reduced in length but will refer to Technical Memorandum No. 1.

Comment #5 — Section 2.0. In the comments on Technical Memorandum No. 1, consideration of additional receptors was recommended. These receptors include current onsite ecological researcher/environmental worker, current offsite agricultural land use, future onsite construction worker, future offsite resident, and future agricultural land use. These additions will affect text in this section as well as Figures 2.1, 2.2, 2.3, 2.4 and Table 2-1.

Response

Responses to comments on Technical Memorandum No. 1 indicated that the future onsite construction worker should be included as an additional category of receptor to be evaluated. Appropriate sections of Technical Memorandum No. 2 will also incorporate this change.

Comment #6

Section 3.1. Explanations of the model selection process should verify that the selected models are the best of the available choices and that they are able to handle all anticipated contaminants. Do the selected models characterize the transport of certain types of chemicals better than others?

This section never clearly states how the selected models will be calibrated. Calibration is necessary for past, current, and future site representations and process descriptions in support of risk assessments and feasibility studies.

Response

For the different types of transport situations, a detailed examination of existing models applicable to each particular situation was made. The advantages and disadvantages of each potentially applicable model were reviewed, and the most appropriate model for each situation was selected as the model of choice. For simplicity, only the selected model was described in detail in the Technical Memorandum. As an example, before the Fugitive Dust Model (FDM) was chosen for modeling the transport of emissions from area sources, it was compared to the commonly used ISCST2 air dispersion model and the recently released ISC2 model. It was found that the FDM model had more sophisticated particle deposition algorithms and more accurate area source calculation techniques than either the ISCST2 or the ISC2 model (personal communication with Robert Wilson, modeling contact, USEPA Region X). Thus, for the particular application to area source fugitive emissions, the FDM model was selected as the most appropriate model and was described in detail in the Technical Memorandum.

The selected model better characterizes the transport of certain types of chemicals than others, but the distinction is based primarily on physical, not chemical, characteristics. One example is gases versus particles, and the type of source is also important. For example, the FDM model was designed specifically to model particulate dispersion and deposition from area sources, and thus was chosen to model the case of fugitive emissions from area sources. If the chemicals of concern were gases from point sources, the ISCST2 or ISC2 model would have been recommended instead. Another example of physical distinction (although not important at OU7) would be the release of dense gases (e.g., liquified natural gas), where a model must take into account density differences and the gravity "slumping" of the plume. In this case, neither the FDM, ISC2, nor the ISCST2 model would be recommended; instead, a more complex model specifically designed for dense gas dispersion would be appropriate.

To confirm their suitability, the models will be validated by comparison to measured data where available. However, none of the selected models was designed to be "calibrated," and it would not be prudent to attempt to calibrate them by arbitrarily changing model parameters to have a better fit for a set of limited data. The selected models each use state-of-the-art mathematical techniques to predict, as accurately as possible, the physical principles of transport and dispersion. Because of the necessary simplifications and assumptions in the model, and because the measured data have no experimental uncertainty and reflect the influence of many other background sources, no model can exactly predict measured data. When compared to many measured data points, however, the model should predict values that are reasonably close, on average, to the measured data. This process is termed "validation" of a model.

If the model predictions are several orders of magnitude different from the measured data, either the model may be inappropriate for the situation or the data are in error. In this situation, it is not prudent to try to "calibrate" the model by changing model parameters to the data; such a calibration may violate physical principles or cause erroneous results for conditions even slightly different from those under all meteorological situations, unless extremely detailed data exist for each hour of the year. Calibration with data under limited meteorological conditions may cause widely erroneous predicted concentrations under other types of meteorological conditions. Thus, validation of a model by comparison with available data is preferable to calibration.

Comment #7 Section 3.2.1. Site-specific data should provide most or all of the values used in any modeling. If default values must be used, they must be justified by demonstrating their applicability to OU7.

If the lag time is found to be on the order of several years, it is probably not negligible and should be incorporated into the model.

Precise differentiation into year-specific submasses, as suggested for the Scholl Canyon Model, may not be possible. Aerial photos and CPT data may provide some guidance for establishing time lines if necessary.

Units should be included with the explanation of terms for the modified Darcy's Law equation on page 3-4.

Response Most of the landfill parameters used in the modeling will be measured at the site. Any parameters not included in the measurement program will be estimated based on data from landfills of similar size and age.

An appropriate lag time will be used in the LANDFIL2 model, based on examination of the history and waste characteristics of the landfill. Year-specific landfill waste masses, which are required as input to the LANDFIL2 Model (based on the Scholl Canyon model), will be estimated using available historical data and aerial photographs.

Units will be included with the explanation of terms for the modified Darcy's Law equation on page 3-4.

Comment #8 Section 3.3. The statement that "no gas-generating landfill refuse is present at the subsurface" at IHSS 203 may need to be re-assessed in light of CPT profiles.

Response Recent field information obtained subsequent to preparation of the Draft Final Technical Memorandum No. 2 indicates that landfill wastes are present below portions of IHSS 203.

Decomposition of landfill wastes causes pressure-driven gas transport to occur. As discussed in Technical Memorandum No. 2, convection (pressure-driven) migration of landfill-generated gas is usually so dominant that gas-phase diffusion and displacement processes become insignificant (see Thibodeaux 1981 and EPA 1991). Therefore, the diffusion-based SEAM model will not be used to estimate air emissions at IHSS 203. Instead, IHSS 203 will be treated as part of IHSS 114, and air emissions will be estimated using the LANDFIL2 model. Although landfill wastes may not be present beneath all portions of IHSS 203, it is conservatively assumed that pressure-driven gas transport occurs throughout all of this IHSS as a result of horizontal migration of gas from areas where wastes are present.

Comment #9 Section 3.3.1. The SEAM model appears to assume homogenous soil without accounting for potential preferred pathways. Is this assumption reasonable for OU7?

Response Based on recent field information, the diffusion-based SEAM model will not be used to estimate air emissions at IHSS 203. See response to Comment #8.

Comment #10 Section 3.3.2. The final sentence under Selection Criteria 1 does not seem to logically follow from the previous sentences. Surface VOC emissions should be expected to represent only the relatively shallow areas. Since contaminants from deeper soil and groundwater contribute very little to surface emissions, they are therefore unrepresented by them.

The final sentence under Selection Criteria 2, which ends with "will not be used in landfill concentrations," is unclear.

Response — See response to Comment #8. The final sentence under Selection Criteria 2 will be edited for clarity.

Comment #11 — Section 3.4. The Fugitive Dust Model (FDM) has been validated by EPA for area sources emitting fugitive particulates. While there has not yet been any validation for vapors, wind tunnel studies have been conducted to compare with model results. If the vapors emitted are found to be much lighter than air and the particle size is set at very small numbers or at zero, the model should be acceptable for use in this case. Should vapor emissions be a gas denser than air, the FDM would not be an acceptable model to use.

The last paragraph in this section, on page 3-8, refers to the conventional box model. This model should be described, or at least referenced, and its use justified.

Response — It is anticipated that vapor emissions at IHSS 114 are lighter than air. Therefore, the particle size for these vapors will be set at a very small number or zero in the FDM model. Modeling of heavy gases will not be required for the risk assessment because heavy gases are not typically associated with landfills (EPA 1991) and a preliminary evaluation of RFI/RI data indicates that heavy gases are not present at OU7.

As discussed in Section 3.4, the indoor box model will assume an appropriate fixed volume and exchange rate. The text will be expanded to state that complete mixing will be assumed and that the algorithm (model) will be calculated using a spreadsheet format.

Comment #12 — Section 3.5. The first paragraph in this section refers to Phase II RFI/RI data. This data will not be available until some time after the Phase I Human Health Risk Assessment is due.

Response — The paragraph in question will be revised to state that site-specific data from the Phase I RFI/RI will be used once they become available.

Comment #13 — Table 3-1. The first parameter should be more specific by stating, "Surface Area of IHSS 114."

Broad ranges of values are associated with the second and third parameters with EPA publications are referenced as the source. Won't site-specific Phase I RFI/RI data be used to generate these values?

The date listed for "time since landfill closure/emplacement of interim soil cover," 1992 should be replaced with a best estimate date of closure. The

Statement of Work in the IAG lists July 1997 as the beginning of IM/IRA construction.

Response

As requested, the first parameter in Table 3-1 will be edited for clarity to indicate the surface area of IHSS 114.

The agency-approved Phase I RFI/RI Work Plan for OU7 does not include field activities necessary to measure the potential methane generation capacity or the methane generation rate constant for the Present Landfill. Appropriate, EPA-approved field techniques for measuring these parameters were not available during preparation of the work plan. However, based on their research, EPA guidance (EPA 1991) indicates that *in situ* measurements are unnecessary because the ranges of values of these parameters conservatively represent landfills throughout the United States. A sensitivity analysis will be performed during modeling with LANDFIL2 to address the range in exposure point concentrations associated with the range of values presented by EPA for these parameters.

The date of landfill closure/emplacement of interim soil cover is assumed to be 1997.

Comment #14

Table 3-2. The SEAM model equation requires values for physical properties of the soil cover (thickness, porosity, intrinsic permeability). This table mentions "data obtained during Phase I RFI/RI" and "RFP OU-specific data," yet neither the OU7 work plan nor the SOPs it references specifically require these soil parameters. Explain what values will be used for this equation.

Response

Based on recent field information obtained subsequent to preparation of the draft TM2, the diffusion-based SEAM model is not appropriate for modeling gas transport at IHSS 203.

Values for the potential methane generation capacity of IHSS 114 and the methane generation rate constant will be based on the range of values provided in the EPA guidance documents referenced in Table 3-1. The agency-approved Phase RFI/RI Work Plan for Operable Unit No. 7 (EG&G 1991) does not include site-specific measurement of these parameters.

Comment #15

Table 3-3. If vapors are considered (see Comment #11), the range of values for particle size could start at 0.

It is unclear how a range of values was derived from the as yet undetermined contaminated area.

Response

The range of values for the particle size parameter presented in Table 3-3 was based primarily on sitewide and OU-specific information provided in the RFEDS data base for soils at Rocky Flats (i.e., 1 to 80 microns). However, the range of values for the particle size parameter in Table 3-3 will be revised to 0 to 80 microns to account for vapors.